

On the origin of the Polish konik and its relation to Dutch nature management

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Abstract: After the end of the last ice age, relatively small numbers of the wild horse managed to survive throughout much of the Holocene in the heavily forested parts of Western and Central Europe. Hunting and being driven from its feeding grounds by man diminished the numbers of these animals. Probably, the last population of these horses survived in the wild in the borderland of East Prussia, Poland and Lithuania, until the 16th Century. The last specimens were housed by Jan Zamoyski in his zoo at Zwierzyniec (SE Poland). There, this (sub)species came to an end, at the end of the 18th Century. On the basis of a report by Julius Brincken in 1826, which stated that the last wild horses would have been crossed with farm horses about 1806, the Pole Tadeusz Vetulani started a breeding-back experiment in the Forest of Białowieża in 1936. It was his intention to get back the wild ancestor by selecting and crossing farm horses from the vicinity of Biłgoraj. After Vetulani's death in 1952, this experiment was taken over by the Polish state, and was moved to Popielno (NE Poland). After the cessation of the breeding-back experiment, around 1970, the konik is still bred there, but these days only as a 'primitive horse breed'. There are several pieces of evidence that show that the Brincken's report on the wild horse was misleading and inaccurate. In addition, Vetulani conducted his experiment in a careless way and, as such, his breeding-back experiment should be considered to have been unsuccessful. In the 1980s, koniks were put out in the Netherlands – first on the Ennemaborgh Estate in 1981 and later in 1984 in the Oostvaardersplassen Nature Reserve - as part of a cheaper and more 'natural' nature management in the Netherlands. There was (and still is) a perception that the konik is 'the most recent descendant' of the European wild horse. Through using specific phrases (such as 'letting nature have its way', 'primeval landscape' and 'Serengeti') managers of the Oostvaardersplassen and some media frame the Oostvaardersplassen area as an untouched and natural ecosystem, which is far from the case.

Keywords: wild horses, feral horses, archaeology, (cultural) history, ecology, morphology, nature management, perceptions.

Introduction

In the course of the 1970s, Dutch nature management adopted new approaches that are still being followed today. Previously, nature reserves were managed by periodic mowing, burning or cutting vegetation. From the 1970s onwards cattle, horses and sheep were increasingly used to manage nature reserves, as this was a cheaper method. This was influenced by the

ideas of the *Stichting Kritisch Bosbeheer* (Critical Forest Management Foundation), which advocated the (re)introduction of lost animal species (elk, wisent and wolf) or substitutes of extinct species (aurochs and wild horse). The underlying thinking was that 'nature' would become more 'natural' by using these animals. This in turn might help to evolve what some saw as more natural, half-open, park-like landscapes. In the long run, human intervention might not even be needed anymore. This line of thinking led to the konik being introduced into the Netherlands in the 1980s.

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Figure 1. Images of wild horses, from the former steppes of south-east Europe. The left hand one was carved out of bone and dates from the 5th millennium BCE (Kvalynsk culture) (Kuzmina 2003). The right hand one dates from the 4th millennium BCE (Maikop culture). It was engraved on a silver beaker and forms a part of a hunting scene, together with several other game animals (Anthony 2007).

Personal doubts on the part of the author of this article, about the status of the konik as being the most recent descendant of the European wild horse, were the initial underlying reason for the study on which this paper is based. In spite of what was claimed, koniks show nearly no striking characteristics of the wild horse, as regards coat colour, mane form, etc. Later, the research was stimulated and further expanded as a result of the commotion over the mass winter starvations of large herbivores in the Oostvaardersplassen area (Province of Flevoland, between the towns of Almere and Lelystad), that have occurred since 2003. The research concerns the history of the European wild horse, the origin of the Polish konik, and its current use in modern day nature management, and perceptions about these horses.

Methods

The research on which this article is based was done as a PhD thesis at the Vrije Universiteit in Amsterdam and was mainly based on literature reviews and other sources (bones, interviews, field visits). The study draws on historical (archaeological and cultural-historical data), biological (animal morphology, ecology, DNA) and philological data. To access this material, libraries and archives in


the Netherlands, Germany and Poland were visited. In addition, field data was gathered from field visits to nature reserves, including the Oostvaardersplassen Nature Reserve, the primeval forest of Rothwald (Austria) and the Vltava flood plains (Czech Republic) to find data on natural processes, and the Sieraków Stud Farm (Poland) to learn more about the ins and outs of konik breeding.

Results

The Holocene horse of Western and Central Europe

During the last ice age, a wide steppe belt extended from Ireland through Europe and Asia as far as North America, mainly consisting of grassland. About 12,000 years ago, the climate changed drastically. Under the influence of increased precipitation and higher temperatures, in Western and Central Europe this steppe belt turned into a mostly forested area (Guthrie 1990, Mitchell 2005, Mol et al. 2006). Large herbivores were not able to prevent this forest growth (see van Vuure 2005 and the references in note 3). Horses were very common on the steppes; there they had plenty of room and grass at their disposal. From the Miocene onwards, the horses developed several bodily adaptations, concerning



Figure 2. The shaded part shows the probable distribution area of the wild horse in Western and Central Europe during the Holocene. This horse died out in southern Sweden and England halfway through the Holocene. It was probably absent from Italy and the Southern Balkans during this time, given the lack of bone finds there (from van Vuure, in press). The former Holocene distribution area of the wild horse in Eastern Europe and Asia is not well known. 1. Dereivka 2. Botai.  Distribution area of the Przewalski's horse, during the 19th and 20th Centuries.

locomotion (limb and muscle constructions), dentition and energy management, that enabled them to better cope with grassy vegetation and predators (Franzen 2010). After the climate changed and forests grew in Western and Central Europe, the horses found themselves in a much less suitable habitat. In North America, the wild horse died out, but in Europe it managed to survive. During the Holocene, in the steppes of Southeastern Europe (e.g. Ukraine) and Central Asia, wild horses survived for a long time in large numbers. The archaeological sites of Dereivka (Ukraine) and Botai (Kazakhstan) (see figure 2), show that wild horses constituted 70-80% of the animals caught by man, at this time (Levine 1999, Anthony 2007). The Przewalski's horse is the remnant of these former large horse populations. About 3500 BCE, the horse was domesticated in the steppe areas of

Ukraine and Kazakhstan (Outram et al. 2009).

After the transition to the Holocene, the numbers of wild horses¹ in Western and Central Europe drastically decreased. Judging from the limited number of sites and bones of this horse, it must have become a relatively rare animal by then (Clason 1986, Uerpman 1990, Benecke 1993, 2006, Döhle 1999, Lõugas 2006, Sommer et al. 2011, Bendrey 2012). Wild horse generally constituted less than 5% of human catches; very often it was lacking. For red deer (*Cervus elaphus*) the opposite holds: during the last ice age it was rare, but during the Holocene it became very common (Zeiler & Kooistra 1998, Hüster-Plogmann et al. 1999, Lauwerier et al. 2004, Louwe Kooijmans 2013). The many thousands of retrieved bones of red deer from the Holocene contrast sharply with the few wild-horse bones. We also know that wild horses, if available, have

always been a sought-after catch (Mager 1941, Levine 1999, Anthony 2007). In the Netherlands too, some Holocene sites such as Hoge Vaart, Swifterbant, Hekelingen and Schokland provide bones of wild horse (Modderman 1953, Clason 1986, Gehasse 1995, Laarman 2001). In the predominantly forested habitat of Western and Central Europe², the wild horse was apparently able to find just sufficient opportunities to survive. In the forest itself, there must have been too little grass available for them to feed on. The only areas that probably were suitable for horses to live in, were marshy areas, where trees could not grow (van Vuure, in press). These would have been the grass and sedge marshes along rivers and at lakes and coasts. The bodily adaptations that were required to live in small, scattered grassy habitats in a large wooded area, would have included a reduction in body size and an adaptation of the coat colour (van Vuure, in press). A (relative) broadening of the hooves also appears to have been an adjustment to life on soft soils. This latter adjustment arose at the transition from the Pleistocene to the Holocene (Kuzmina 1997, Baales 2002, Bignon & Eisenmann 2006, Van Asperen 2010, Boeskorov et al. 2014). As far as it can be currently ascertained, the wild horse of Western and Central Europe was relatively small, with a shoulder height of 120 -130 cm. It had a dun to dark brown coat colour, with a very dark dorsal stripe on the back. The short erect mane was also a very dark colour.

As man hunted the wild horse and brought land into cultivation, wild horse numbers decreased. Because it is difficult to distinguish bones of the wild horse from bones of the domestic horse, it is difficult to ascertain how quick this decline was, and to what extent in which areas. Mentions of 'wild horses' have been handed down to us from both classical antiquity and the Middle Ages. It is often difficult to make out whether these concerned originally wild horses or feral domestic ones. However, one area in Europe stood out in terms of number and nature of the mentions

of 'wild horses' (van Vuure, in press). This was the area of the Great Wilderness. This wilderness area of forests and marshes, hardly influenced by man, was largely situated in former East Prussia, and partly in neighbouring Poland and Lithuania (figure 3). Wild horse probably still existed there from the late 13th to the early 16th Centuries (Mager 1960). The descriptions of the horses living there in the wild, of their physical appearance (body size, coat colour), their nature (ability to be tamed, shyness), and the way man regarded and treated them (they were sought-after by the nobility for their private zoos, but regarded as useless for production), might be considered as valid arguments to believe that this really was the last population of wild horses of Central Europe. Alongside the wild horse, aurochs (*Bos primigenius*), wisent (*Bison bonasus*), elk (*Alces alces*) and wolverines (*Gulo gulo*) also held out for a relatively long time in the Great Wilderness. At the end of the 16th Century, mentions of the wild horse in the wild abruptly ceased. From that time on, (reliable) mentions of the wild horse have been connected with Jan Zamoyski, an influential Polish count, and his family. In the late 16th Century, Jan Zamoyski founded a large and prestigious zoo and wildlife park near the village of Zwierzyniec, in SE Poland (see figure 3). Mentions and descriptions of wild horses in this zoo have been handed down from the late 18th Century. Hacquet (1794), who visited this zoo, mentioned that the last wild horses were either shot there, or found their end in the wild-animals theatre (*Hetztheater*) in Lemberg (now Lviv, Ukraine). Descriptions of 'wild horses' in the Russian steppes were recorded well into the 19th Century, but there are large doubts about their reliability (van Vuure, in press).

The origin of the Polish konik

An important influence on current thinking on the European wild horse is the book pub-

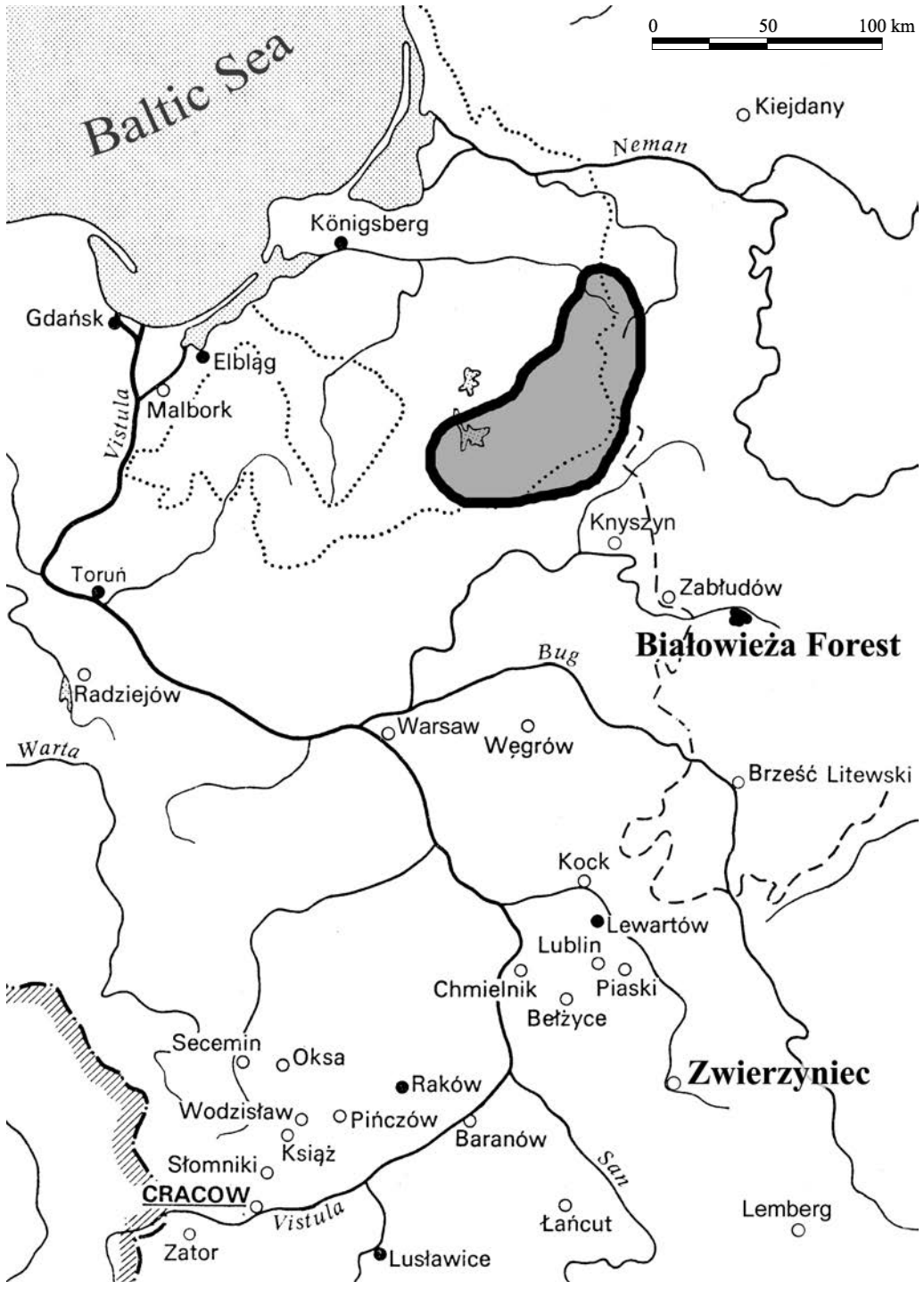


Figure 3. Map of East Prussia (capital: Königsberg) and a part of Poland and Lithuania, in the 16th Century, showing the supposed last living area of the wild horse of Central Europe, the Forest of Białowieża and the village of Zwierzyniec.

lished by the German forester Julius Brincken in 1826, in which Brincken described the flora and fauna of the Białowieża Forest, a large primeval forest situated on the border between Poland and Belarus (see figure 3), and also paid attention to the lost wild horse. The descriptions he gave of this animal and its disappearance continue to be central to the 20th Century perceptions about this horse and the Polish konik, bred halfway through that century. Brincken wrote that the Białowieża Forest had formed the last living area of the wild horse. During the late 1780s, the last wild horses would have been captured there and transported to the zoo of the Zamoyski family. About 1806, he claimed that they were distributed among local farmers, who then crossed them with their own horses. According to Brincken, in his time 'these wild horses would be still recognisable among the horses of the farmers'. However, Brincken did not state well what these horses looked like, nor where he got his information from (which is a common shortcoming of Brincken's style of researching and reporting).

Some years after the publication of Brincken's book, considerable criticisms were made of it by contemporary local scientists (see Daszkiewicz et al. 2004). According to these critics, Brincken was often very inaccurate in collecting and checking data about plant and animal species. The book was "teeming with errors, inaccuracies and fabrications" (Daszkiewicz et al. 2004, p. 25). For instance, Brincken mentioned the occurrence of *Tilia platyphyllos*, *Acer pseudoplatanus*, *A. campestre*, *Alnus incana*, *Sambucus nigra*, *Populus alba*, *Prunus spinosa* and *Crataegus oxyacantha*, tree species that - according to contemporary and current experts (Daszkiewicz et al. 2004, Błoński et al. 1888, Faliński 1986) - did not grow in that forest. As for animals, Brincken mentioned the occurrence of the Russian flying squirrel (*Pteromys volans*), three different 'species' of brown bear (*Ursus arctos*) (a large, nearly black bear, a medium-sized brown one and a silver col-

oured small one), wolverines (*Gulo gulo*), two different 'species' of red squirrel (*Sciurus vulgaris*) (a white one and a gold coloured one) and steppe polecat (*Mustela eversmanii*); certainly not all of which occurred there at that time. In addition, he gave several incorrect data on wisent (European bison) numbers, and on local geography and history. These are just a few of Brincken's many errors. However, the criticisms, expressed by experts like S.B. Górski, F.P.S. Jarocki and E. De Ronca, were soon forgotten. Later, various authoritative writers, especially from abroad, referred to Brincken's book as a reliable source of knowledge about the Białowieża Forest. In the 20th Century, Brincken's version of the physical appearance and the disappearance of the last wild horses began to play an influential role in the debate on whether descendants of the last wild horses actually still existed. The next step in this development was a research, by Grabowski & Schuch in 1921, done on farm horses (called 'koniki') in the vicinity of the village of Biłgoraj, about 20 km west of Zwiierzyniec. Their research described the local farm horses and how they were linked to the last wild horses from the Forest of Białowieża. This research motivated Tadeusz Vetulani, an animal breeder, to start his own research on farm horses near Biłgoraj.

Vetulani carried out his research on the koniks of Biłgoraj in the course of the 1920s. The research consisted of measuring a series of skull characteristics in these horses, e.g. lengths and widths of the different parts of the skull, the form of the forehead and that of the profile line of the skull. These characteristics were compared with the skull characteristics of two supposedly wild horses (known as the Cherson tarpan and the Tauric tarpan). These two 'tarpans' were caught in the Russian steppes halfway through the 19th Century. He did this comparison on the basis of a statistical method, which at that time was known as the 'differential method of Czekanowski'. This method was based on determining the differences between each skull and every

other one, with regard to x number of characteristics. Per skull pair, these differences were added up and divided by x to obtain the overall average. The smaller this average, the greater the relationship between the skulls, reasoned Czekanowski.

During the 1930s, Vetulani believed he had obtained sufficient evidence to label the koniks of Biłgoraj as recent descendants of the last wild horses of Central Europe. He then conceived the plan to try and breed back that wild ancestor, using a selection of horses from (mainly) Biłgoraj. In his breeding experiment, Vetulani focused on characteristics such as the 'mouse-grey' summer coat, the white winter coat, the dorsal stripe and the erect mane. In 1936, he started such a breeding-back experiment in a small reserve in the Forest of Białowieża (Vetulani 1936) where, according to Brincken, the last wild horses would have lived³. When the second World War broke out in Poland, in September 1939, the experiment was taken over: first by the Russians, and subsequently by the Germans in June 1940. The Russians had a strong interest in Vetulani's experiment and wanted to continue it. The German management of the experiment practically dismantled it, through the agency of Lutz Heck. After the war, Vetulani was able to continue his experiment with the remnants of the experiment, supplemented with newly acquired horses – even though the newly-installed communist government increasingly frustrated his work. After the death of Vetulani, in 1952, the experiment was moved from Białowieża to Popielno, in NE Poland, where the state drove it in two directions from 1955 onwards (Pruski 1959). One part of the koniks was put out in a large reserve, to run wild. The other part went on as the 'stable group'. The latter group was bred to acquire a better agricultural horse. In subsequent years, regular exchanges occurred between the two groups of horses to prevent inbreeding. About 1970, the authorities came to the conclusion that the breeding of agricultural horses was no longer necessary as the tractor would take

over the role of the farm horse. It was also decided that it was not possible to breed back the wild horse, and the breeding was turned to "a kind of preservation breeding of a primitive horse breed" (Jeziernski & Jaworski 2008). Today, the Polish konik is used in various branches of equestrianism, crossed with other horse breeds, and exported. The koniks that were bought to the Netherlands in the early 1980s came from Popielno.

Criticisms of Brincken and Vetulani

As already mentioned, the contemporary criticisms of Brincken's book were soon lost to oblivion. Thanks to the publication by Daszkiewicz et al. (2004), there is once again more awareness of these criticisms. A closer study of Brincken's book, made as part of this PhD research, showed that it contains many more errors and fabrications in the reporting of the extant flora and fauna than initially thought. In particular Brincken's report on the wild horse had never been criticised by anybody. His report turned out to be very shaky (van Vuure, in press), because he wrongly quoted or interpreted texts from a number of authors. For instance, Brincken's assertion that the last European wild horses lived in the Forest of Białowieża in the 18th Century is inaccurate. He misinterpreted texts by the Polish authors Rzączyński (1742) and Czacki (1801). Rzączyński wrote about wild horses in the 16th Century and these were not located in the Forest of Białowieża. In fact, Czacki's text also concerned wild horses in the 16th Century and a careful reading of his text suggests that a printing error is responsible for a wrong time indication. Secondly, there are no reliable 18th-century authors, who mention this horse being extant in Poland or Lithuania in the wild, in the 18th Century; neither Connor (1700), nor Rzączyński (1742), nor the Forst-Ordnung für Ost-Preußen und Litthauen (1775), Kluk (1779), Büsching (1788), Gilibert (1796) or Czacki (1801) mentioned it. Thirdly,



Figure 4. The konik stallion Tref in its white winter coat in March 1936. For Vetulani, Tref was one of the most important breeding horses in his experiment (from Vetulani 1938).

there are good political reasons to assume that the last wild horses were not transported from Białowieża to Zwierzyniec in the 1780s, as Brincken described. Firstly, the then Polish king was very interested in hunting and big game and would probably have done everything in his power to keep these horses at Białowieża. Secondly, these horses would have been transported to enemy territory: at this time Zwierzyniec was situated in Austria, which annexed a large part of Poland in 1772. Moreover, there are already mentions of wild horses at Zwierzyniec from the early 1770s. Finally, it seems unlikely that the last wild horses would have been distributed among local farmers, as Brincken described, as ‘farmers’ were the lowest social class. They

were called serfs, but were in fact slaves, without any property and at the mercy of the arbitrariness of the estate owner. During the 1780s and 1790s, an economic crisis raged in that region (Galicia, in SE Poland), there was great social unrest and the Zamoyski family was regularly on war-footing with these ‘farmers’. It is unlikely that the Zamoyski’s would have fêted these ‘farmers’ with great gifts. And even if these farmers were given the wild horses, it would have been counter-productive for them to cross them with (relatively highly bred) farm horses. Because of their ‘weak’ constitution and ‘bad’ character these wild horses were “of no use at all” (“*nullum ad usum*”) for agriculture, as several 16th-century authors had observed (e.g. Stella 1518, Gra-

tiani 1669). Moreover, horse breeding was at a high level at Zwierzyniec, from the late 18th century onwards, and expensive horses were being imported from Prussia, Turkey, England and Italy for breeding purposes. It seems more likely that the last wild horses were, as Hacquet (1794) wrote, deliberately killed in the early 1790s. Lack of interest and economic cutbacks must have been the reason for this.

The untenability of Brincken's account is reason to criticise Vetulani's work. Another relates to the methods employed by Vetulani, while researching the koniks of Biłgoraj, and the execution of his breeding-back experiment. His experiment was not objective, he selected the animals to measure from those that already met his expectations. Because well-known hippologists of the time, such as L. Adametz and O. Antonius, considered the wild horse as being of the eastern (oriental) type, Vetulani removed all western type Biłgoraj horses from the basic material to be researched, in favour of oriental ones. Afterwards he concluded, understandably, that the wild horse was of the oriental type. To compare these horses, he also departed unconditionally from the originally wild character of the Cherson tarpan and the Tauric tarpan, whose skull measures were included in the experiment. In addition, Vetulani used some other horse skulls, found in archaeological sites, which he assumed to have belonged to wild horses; however, afterwards they turned out to be from domestic horses (Herre 1939). Vetulani's use of the differential method of Czekanowski was also made arbitrarily (Skorkowski 1934). Other researchers, using the same data, came to different conclusions. Moreover, Czekanowski himself changed his method, because of criticisms, while Vetulani continued to use the method that Czekanowski had devised initially. Later, Czekanowski's method became entirely obsolete and was abandoned, because of its unsoundness. By giving so much focus to certain skull characteristics (e.g. the concave profile line of the head), as being typical of the Central Euro-

pean wild-horse (sub)species, Vetulani failed to realise that these could fall within the natural range of variation of a horse species (Herre 1939). For example, Przewalski's horse can also have a concave head profile line. Moreover, according to Herre, Vetulani had been overly influenced by the dubious assumptions of authorities of the time, such as Adametz and Anthonius, who not only considered the Cherson and Tauric tarpans as being originally wild horses, but also considered certain horse breeds, including the Arabian and Bosnian breeds, to be 'descendants of the tarpan'. Moreover, both disagreed with each other as regards the exact appearance of the 'tarpan' skull.

After the breeding of koniks was moved to Popielno, in 1955, the initial breeding objectives of Vetulani were partly abandoned (Pruski 1959). The white winter coat (see figure 4) was no longer aimed for, nor were the concave profile line of the head and the short erect mane. Inbreeding, sometimes used by Vetulani, was prevented as much as possible, from 1955 onwards. Eventually, as mentioned above, the actual back-breeding ceased. Today, the konik with its blue dun coat colour, its shoulder height of 130-140 cm and its long hanging mane bears little resemblance to the wild horse.

The introduction of the konik in the Netherlands

In 1981, the konik was introduced to the Ennemaborgh Estate (in the Province of Groningen) as a substitute of the extinct European wild horse, to be used in the new approach to nature management (Poortinga 1981). It was considered to be the closest living relative of the extinct Western and Central European wild horse and to be well suited for re-establishing the former natural landscape. Three years later, in 1984, the (Dutch) Forestry Commission also purchased koniks from Poland, which were put out into the



Figure 5. Konik horses in the Blauwe Kamer Nature Reserve, near Rhenen, the Netherlands. Photo: T. van Vuure.

Oostvaardersplassen Nature Reserve in the same year. In the previous year the Dutch Forestry Commission had introduced Heck cattle in the same area with the aim of establishing short grassy vegetations for the benefit of the many greylag geese (*Anser anser*) occurring there. In addition, the commission was also regulating the water level for the geese's benefit (Poorter 1982). The, then already, massive occurrence of these geese was and is considered by many as a genuine primeval phenomenon in north-western Europe. However, in the Netherlands there are no historic descriptive accounts or evidence from archaeological excavations (Zeiler 1997, Lauwerier et al. 2005, Brinkkemper et al. 2010; mallards - *Anas platyrhynchos* - turned out to be much more hunted) to support this belief. Nevertheless, a high priority is given to preserving large geese numbers in the Oostvaardersplassen Nature Reserve yet.

The idea was that the deployment of horses, which graze in a somewhat different way

than cattle, would create a more varied vegetation. The Forestry Commission had chosen the konik, not only because it was considered as a primitive and hardy horse breed but also because it was considered to be "the most recent descendant of the wild horse" (Vera 1984). They also thought it important that the konik would not immediately remind people of a common domestic horse, and arouse the public's pity when it lost a lot of weight in winter. The target that was applied to the Oostvaardersplassen: 'realising short grassy vegetation for geese', has since been expanded. There was a view that it was important to show that the 'natural' Holocene landscape of Western and Central Europe was actually a semi-open landscape, emerged under the influence of grazing and browsing by large herbivores such as wisent, aurochs, wild horse and others. By the late 1970s, this idea had already been developed by the Critical Forest Management Foundation and others (e.g. van de Veen & van Wieren 1980, Poortinga

1981, van der Lans & Poortinga 1986). Later, Vera (2000) tried to give this view a broader scientific basis, by means of palynological and other data. The idea that the original natural landscape of the Holocene was half-open, has found a lot of support among biologists and nature lovers (e.g. Bunzel-Drüke et al. 1994, Olf et al. 1999, Wigbels 2002). On the other hand, there has been criticism of it from archaeologists (e.g. Zeiler & Kooistra 1998, Louwe Kooijmans 2012) and silviculturists (e.g. Borgesius & van Tol 1998, Feijen 2003, Bobiec et al. 2011, Tanentzap et al. 2012), who argue that that landscape was heavily and densely forested and that this would have limited the numbers and impact of large herbivores. The debate on this continues to this day.

Koniks have successfully developed both on the Ennemaborgh Estate and in the Oostvaardersplassen and have also been introduced to other Dutch nature reserves (figure 5). On the Ennemaborgh Estate, human intervention limits the number of koniks to around 30-35 living on an area of 170 hectares. By contrast, in the Oostvaardersplassen area, nature determines the size of their population, through natural food availability and climatic factors. In recent years, the number of koniks there has fluctuated at around 900. A few years ago, there were around 4000-5000 Heck cattle, koniks and red deer on this site, which means one large herbivore per 0.5 ha. Since the winter of 2002/2003, and especially in late winter, large scale starvation of Heck cattle, koniks and red deer have regularly occurred. Such a level of mortality was hitherto unknown in the Netherlands. This mortality, and possible management measures to control it, have been (and continue to be) fiercely debated, and return with some regularity in the mass media (van Vuure, in press). Under the current management regime of the Oostvaardersplassen animals that are near death are shot, to avoid animal suffering and public outrage. Dead Heck cattle and koniks also need to be removed as much as possible from the area, to prevent possible outbreaks

of animal diseases that might be harmful to nearby commercial livestock units.

Perceptions surrounding the wild horse and the konik

Historically, the horse has occupied a very special place in human society. Initially, it formed a major catch, attractive because of the meat and the hides it provided. Once the horse was domesticated, other material, and immaterial, values were added. The horse not only played an important role in transport and warfare, but also in religion, folklore and in providing social status. By being able to ride horses, people were able to move rapidly over large distances. This greatly contributed to the spread and influence of the Indo-European tribes from their area of origin, the Eurasian steppes (Anthony 2007).

The views on the last wild horses in the Great Wilderness varied quite a lot. In general, people had little appreciation of them. These horses would have been too weak and have had too 'bad' a character to be deployed for the army or agriculture. The nobility, on the other hand, were very interested in them. To them, this horse, like the aurochs, the wisent and the elk, was a sought-after zoo animal in the 16th Century. Nobles did not spare trouble nor expense to get such special animals from afar into their zoos, to show them to family members and high society, and acquire a lot of prestige. For such reasons, the powerful Polish nobleman Jan Zamoyski had wild horses in his zoo around 1600, alongside other unusual animals including even aurochs, an animal that then only occurred in the Royal Forest of Jaktorów, in Central Poland. In the 1560s, the wild horse had already become so rare in the Great Wilderness, that it was no longer possible to supply the demand from foreign nobility.

Initially, the research on, and the breeding of, koniks in Poland, by Vetulani and later the Polish State, had nothing to do with nature

management. It started as a morphological study of a group of 'primitive' horses, in an agriculturally backward region. Grabowski & Schuch (1921) linked these horses, through Brincken's account, to the extinct Central European wild horse. Vetulani, in particular, added an aspect of national pride to this story. In a speech in 1927, he was proud that the 'tarpan', as he called the extinct European wild horse, had retained its superior features, not only in the koniks of Biłgoraj, but in more Polish horses (Vetulani 1927). According to him, this would open up unprecedented possibilities for breeding horses especially for agriculture, and even for equestrian sports. With financial support from the Ministries of Agriculture and of War, which hoped for better horses for agriculture and the army, he began his breeding-back experiment in 1936 (Vetulani 1938). For financial reasons, Vetulani seems to have pretended, or to have even thought to himself that a bred-back wild horse would also be fit for agriculture and the army. Another aspect of back-breeding the konik had to do with Poland, becoming an independent country again in 1921 after 126 years. Breeding the konik contributed significantly to national pride (Czarnowski 1957, Lizet & Daszkiewicz 1995, Wajrak 2000, Daszkiewicz 2003). Poland was 'back on the map' and had been able 'to breed back the European wild horse', a horse that was so strongly associated with Polish nature and Polish history.

The role allotted to the konik in the Netherlands was of a very different nature. Here, the 'resurrected wild horse' was chosen to give nature its 'original appearance'. This was one of the reasons why it was introduced to the Oostvaardersplassen. The image of the konik as 'bred-back primeval horse', along with Heck cattle as 'bred-back aurochs', greatly contributes to the current perceptions of the Oostvaardersplassen (Markerink 2002, Vera et al. 2007, Smit et al. 2010). Nature managers and the media regularly describe this nature reserve as a 'primeval landscape, such as those that could be seen in the Netherlands thou-

sands of years ago' (Staatsbosbeheer website, F.W.M. Vera in Kolbert 2012). By many it is seen as decisive evidence of the proposition that large herbivores are capable of counter-acting forest growth by nature, and giving the landscape a park-like appearance. Terms like 'letting nature have its way', 'primeval landscape', 'Serengeti' and 'untouched wilderness' are often used to describe the Oostvaardersplassen (Bethge 2001, Wigbels 2002, Veer et al. 2005, Linnartz & Helmer 2009, van de Klundert 2012, Kolbert 2012, Reed 2013): as such we are dealing with a case of, conscious or unconscious, framing (van Vuure, in press). That means, by a particular choice of words and way of reasoning, an image is evoked, which in its clarity and simplicity can be highly convincing, and finds easy acceptance by the general public. The widespread fascination for wildernesses and extinct animal species may contribute further to this. Yet, the Oostvaardersplassen does not form a complete and primeval ecosystem, as would have existed in Mid-Holocene Europe (van Vuure, in press). It is a biologically-artificial ecosystem, where some large herbivores are allowed to be present and others (e.g. elk (*Alces alces*), wild boar (*Sus scrofa*)) are not, and moreover under restrictive conditions imposed by man. Roe deer (*Capreolus capreolus*), an indigenous deer species in the Netherlands, were initially present in the Oostvaardersplassen, but have been out-competed and have since disappeared there (van Manen 2013). Large predators, such as wolf (*Canis lupus*), brown bear (*Ursus arctos*) and lynx (*Lynx lynx*) are also missing. The general public is not really aware of the appearance or functioning of an 'untouched' European ecosystem, and is easily influenced by the choice of words used to describe the Oostvaardersplassen. Moreover, the promotion of grazers and grazing projects leads to people to assume *a priori* that large herbivores are always able to have a strong impact on tree growth. On the other hand, human empathy is put to the test by the regular massive starvation of these large herbi-

vores in late winter. The absence of large predators leads to a concentration of starvation in late winter (instead of throughout the year) and the absence of scavengers counteracts the rapid decay of dead bodies, moreover. The open treeless landscape makes these deaths even more visible. Here, the romanticism of nature conservation and human empathy conflict with the harsh reality of nature.

Discussion

Although we have learned more in recent years about the appearance and habitat of the lost wild horse of Western and Central Europe, not all details about them are yet clear. More data from more bone finds, supplemented with ancient-DNA research on these bones, may possibly shed more light on them in the future. Bone research on wild horses should focus on limb bones and dentition, to learn more about niche adaptations. A decline in body size and the development of (relatively) broader hooves were possibly among such adaptations. Comparative bone research, to discriminate wild horses from domestic horses, should preferably be done on large numbers of horse bones, since different horse breeds can be osteologically similar (Benecke 2006, Cieslak et al. 2010) and wrong conclusions can be easily drawn. As regards DNA research, mitochondrial DNA may elucidate relationships between horse breeds, but does not allow us to determine a possible close relationship with originally wild horses. Many current horse breeds possess mitochondrial DNA of their wild ancestors (Cieslak et al. 2010). Nuclear DNA, on the other hand, will reveal more details about horse morphology and relationships. However, hardly any nuclear DNA research on (Holocene) Western and Central European wild horses has yet been done.

It has been shown that konik horses are able to maintain themselves in certain nature reserves all the year round, but other 'primi-

tive' horse breeds are probably able to do the same. In this respect, some also suggest the Exmoor pony is an original wild horse - and in some respects this horse breed resembles the wild ancestor even more (Hovens & Rijkers 2013). However, the Exmoor pony too is not the original European wild horse; historical records, bone comparisons and DNA research have not been able to demonstrate this so far (Green 2013, van Vuure, in press). When looking to create large nature reserves in Europe ('*Rewilding Europe*'), in which (nearly) all original (Holocene) animal species are introduced, the pros and cons of the (primitive) horse breed to be used need to be carefully considered. The fact is, in real-life natural situations these horses would also have been confronted with large predators such as wolves and bears, which will make high demands on the horses as regards defensibility, running speed and sensory abilities.

Despite all the commotion about the konik, we can conclude that the efforts of Vetulani did lead to the saving of the konik - which was an old breed of farm horse. But there is less unanimity about the konik's 'unique' role in nature management. In the Oostvaardersplassen, the disappearance of elder (*Sambucus nigra*) and willow (*Salix* sp.) forests, the close-grazed grass vegetations and the decline of 36% of bird species since 1997, have led many people to argue that there is overgrazing and ecological devastation (e.g. Bijlsma 2008, Van Manen 2013, van Beusekom 2014). The discussion about the impact that large herbivores exert on the vegetation is still ongoing, but is currently at an impasse and it is the question how it will be resolved.

One suggestion is enlargement: connecting the Oostvaardersplassen to the south with the Horsterwold Forest or the Veluwe area. But this would only provide a temporary relief from the shortage of food for the large herbivores. After a few years, overpopulation would reoccur, leading to the same discussions that are being heard now. In addition, in the Veluwe area the approach to game man-

agement is totally different than that in the Oostvaardersplassen. Also, there are veterinary reasons for restricting the admission of Heck cattle and konik horses into the Veluwe. The numbers of large herbivores in the Oostvaardersplassen seem to be decreasing, especially the number of red deer⁴. This opens up an interesting new phase. Will their numbers continue to fall further? Will willows and elders extend over the area, as a result of this? And why are the numbers of large herbivores only decreasing now, and not, say, five years before? Physiological research on these large herbivores might explain how these animals adapt themselves to changing food levels and how they function in an ecosystem without predators. If the population decline, especially that of the red deer, does not continue, it could be possible to experimentally introduce wolves into this area. Wolves are specialised deer hunters and should strongly reduce the numbers of deer. Elsewhere, it has been shown that wolves really are capable of this (Jędrzejewska & Jędrzejewski 1998, Flueck 2000, Ripple and Beschta 2012). The questions of how wolves would behave socially in the Oostvaardersplassen area (would they form one pack or more?), and how the public would react to the presence and the impact of wolves, would also be interesting issues.

Summary and conclusions

This research reveals more about the physical appearance and the habitat of the lost Holocene wild horse of Western and Central Europe. This horse sub-species had a shoulder height of 120–130 cm, had a dun to dark brown coat colour and a short erect mane. It probably lived in small groups in low densities in marshes along rivers and lakes. This paper also clarifies the facts about the demise of this wild horse: how and where it came to an end. The analysis of the report by Brincken on the wild horse has shown that this report is totally unreliable. The analysis of Vetulani's

working methods has shown that his breeding-back experiment did not reach its objective. With these analyses, the myth of the konik, as being the closest existing descendant of the European wild horse and the breed most similar to it should be laid to rest.

In itself, the konik performs well as a grazer in some nature reserves in the Netherlands, but its role might be taken over by (various) other horse breeds. Other 'primitive' breeds are also able to survive in such a situation all year round. The perception of the konik, as the breed most similar to its extinct ancestor, played a major role in the preference for this horse breed in the early 1980s.

The framing of the Oostvaardersplassen as an 'untouched natural ecosystem' is unjustified, because of its incompleteness and artificiality. The discussion on the appearance of the Holocene natural landscape of Western and Central Europe will doubtless continue unabated.

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References

- Anthony, D.W. 2007. *The Horse, the Wheel and Language. How Bronze-Age riders from the Eurasian steppes shaped the modern world.* Princeton University Press. Princeton, New Jersey, USA.
- Baales, M. 2002. Auf der Fährte spätglazialer Pferde bei Mertloch (Neuwieder Becken, Mittelrhein, Deutschland). *Bonner Zoologische Beiträge* 50 (3): 109-133.
- Bendrey, R. 2012. From wild horses to domestic horses:

- a European perspective. *World Archaeology* 44 (1): 135-157.
- Benecke, N. 1993. Tierdomestikation in Europa in vor- und frühgeschichtlicher Zeit – Neue Daten zu einem alten Thema. *Bericht der Römisch-Germanischen Kommission* 74: 5-47.
- Benecke, N. 2006. Late prehistoric exploitation of horses in Central Germany and neighbouring areas: the archaeozoological record. In: S.L. Olsen (ed.). *Horses and humans: the evolution of human-equine relationships: 195-208*. BAR International Series 1560. Archaeopress, Oxford, UK.
- Bethge, P. 2001. Serengeti hinter den Deichen. *Der Spiegel* 32: 154-156.
- Bignon, O. & V. Eisenmann 2006. Western European Late Glacial horse diversity and its ecological implications. In: M. Mashkour (ed.). *Equids in Time and Space*. 9th ICAZ Conference, Durham 2002: 161-171. Oxbow Books, Oxford, UK.
- Bijlsma, R.G. 2008. Broedvogels van de buitenkaadse Oostvaardersplassen in 1997, 2002, 2007. A & W-rapport 1051. Altenburg & Wymenga, Veenwouden, the Netherlands.
- Błoński, F., K. Drymmer & A. Ejsmond 1888. Sprawozdanie z wycieczki botanicznej, odbytej do puszczy Białowieskiej w lecie 1887 roku. *Pamiętnik Fizyograficzny* 8 (III): 59-74.
- Bobiec, A., D.P.J. Kuijper, M. Niklasson, A. Romankiewicz & K. Solecka 2011. Oak (*Quercus robur* L.) regeneration in early successional woodlands grazed by wild ungulates in the absence of livestock. *Forest Ecology and Management* 262 (5): 780-790.
- Boddaert, P. 1785. *Elenchus animalium*. Vol I: Sistens quadrupedia huc usque nota eorumque varietates. C.R. Hake, Rotterodami.
- Boeskorov, G.G., A. Protopopov, O. Potapova, V. Plotnikov, N. Rudaya, S. Zhilich & S. Trofimova 2014. A study of a frozen mummy of a horse from the Holocene of Yakutia, Russia. The Vth International Conference on Mammoths and their Relatives, at Grevena-Siatista, Greece. *Special Volume* 102: 33-34.
- Borgesius, J.J. & G. van Tol 1998. Metaforen die te ver voeren – wilde ideeën, eenzijdige visies. *Nederlands Bosbouw Tijdschrift* 70: 116-118.
- Brincken, J. 1826. *Mémoire descriptif sur la forêt impériale de Białowieża en Lithuanie*. Glücksberg, Varsovie, Poland.
- Brinkkemper, O., E. Drenth & J.T. Zeiler 2010. De voedsel-economie van de Vlaardingen-cultuur in Nederland – een algemeen overzicht. *Westerheem, Special* 2010: Vlaardingen-cultuur: 26-51.
- Bunzel-Drüke, M., J. Drüke & H. Vierhaus 1994. Quaternary Park. Überlegungen zu Wald, Mensch und Megafauna. *Bad Sassendorf. ABUinfo* 17/18 (4/93 and 1/94): 4-38.
- Büsching, A.F. 1788. *Erdbeschreibung*. Zweyter Theil welcher Ost- und West-Preussen, Polen und Litauen, Galizien und Lodomerien, Ungarn, die denselben einverlebten Reiche und Siebenbürgen, die Republik Ragusa und das osmanische Reich, enthält. Hamburg, Germany.
- Cieslak M., M. Pruvost, N. Benecke, M. Hofreiter, A. Morales, M. Reissmann & A. Ludwig 2010. Origin and history of mitochondrial DNA lineages in domestic horses. *PLoS ONE* 5 (12): e15311. doi: 10.1371/journal.pone.0015311.
- Clason, A.T. 1986. Het voorkomen van het wilde paard *Equus ferus* Boddaert 1785 in Nederland vanaf het Laat-Glaciaal. *Lutra* 29 (2): 303-306.
- Connor, B. 1700. *Beschreibung des Königreichs Polen und Grosz-Herzogthums Litthauen*. Leipzig, Germany.
- Czacki, T. 1801. *O Litewskich i Polskich prawach, o ich duchu, źródłach, związku i o rzeczach zawartych w pierwszym statucie dla Litwy 1529 roku wydanym*. Volume II. Warszawa. W drukarni J.C.G. Ragoczego.
- Czarnowski, M. 1957. *Jak u nas wymierają rzadkie zwierzęta i prawdziwi uczeni*. Unpublished. Typed manuscript, available at the Archiwum Tadeusza Vetulaniego, in Poznań, Poland.
- Daszkiewicz, P. 2003. The work of Tadeusz Vetulania as viewed by a science historian. *Prace Komisji Nauk Rolniczych i Komisji Nauk Leśnych* 95 (supplement): 9-13. Poznańskie Towarzystwo Przyjaciół Nauk, Wydział Nauk Rolniczych i Leśnych, Poznań, Poland.
- Daszkiewicz, P., B. Jędrzejewska T. & Samojlik 2004. *Puszcza Białowieska w pracach przyrodników 1721- 1831*. Semper Scientific Publishers, Warszawa, Poland.
- Davies, P. 2008. *Snails – Archaeology and landscape change*. Oxbow Books, Oxford, UK.
- Dinnin, M.H. & J.P. Sadler 1999. *10.000 Years of change:*

- the Holocene entomofauna of the British Isles. *Journal of Quaternary Science* 14 (6): 545-562.
- Döhle, H.-J. 1999. Pferdenachweise aus dem Mesolithikum und Neolithikum in Deutschland. In: C. Becker, H. Manhart, J. Peters & J. Schibler (eds.). *Historia animalium ex ossibus*. Festschrift für Angela von den Driesch: 149-159. Verlag Marie Leidorf, Rahden, Germany.
- Faliński, J.B. 1986. Vegetation dynamics in temperate lowland primeval forests: ecological studies in Białowieża forest. Junk, Dordrecht, the Netherlands.
- Feijen, J.M. 2003. Oak, King or Villein? MSc Thesis nr. AV-2003-17. Forest Ecology and Forest Management, Wageningen University, Wageningen, the Netherlands.
- Flueck, W.T. 2000. Population regulation in large northern herbivores: evolution, thermodynamics, and large predators. *Zeitschrift für Jagdwissenschaft* 46 (3): 139-166.
- Forst-Ordnung für Ost-Preußen und Litthauen (De Dato Berlin, den 3. December 1775). Available at the Geheimes Staatsarchiv Preußischer Kulturbesitz, Hauptabteilung I, Rep. 7, Nr. 85.
- Franzen, J.L. 2010. *The Rise of Horses: 55 million years of evolution*. John Hopkins University Press, Baltimore, USA.
- Gedda, B. 2001. Environmental and climatic aspects of the early to mid Holocene calcareous tufa and land mollusc fauna in southern Sweden. Lundqua Thesis 45. Lund University, Lund, Sweden.
- Gehasse, E.F. 1995. *Ecologisch-archeologisch onderzoek van het neolithicum en de vroege bronstijd in de Noordoostpolder, met de nadruk op vindplaats P14*. PhD thesis. Universiteit van Amsterdam, the Netherlands.
- Gilibert, J.E. 1976. *Sur les forêts de Lithuanie*. Rozier & M.-A.-L. Claret de la Tourette. *Démonstrations Élémentaires de Botanique*. Quatrième Edition, tome premier: xl-xxlvj. Bruyset aîné & c., Lyon, France.
- Girling, M.A. 1989. Mesolithic and later landscapes interpreted from the insect assemblages of West Heath Spa, Hampstead. In: D. Collins & D. Lorimer (eds.). *Excavations at the Mesolithic Site on West Heath, Hampstead 1976 – 1981*: 72-89. BAR British Series 217.
- Gmelin, S.G. 1770. *Reise durch Rußland zur Untersuchung der drey Natur-Reiche*. Erster Teil. Reise von St. Petersburg bis nach Tscherkask der Hauptstadt der Donischen Kosacken in den Jahren 1768 und 1769. St. Petersburg, Russia.
- Grabowski, J. & S. Schuch 1921. *Badania nad koniemi miejsowym*. *Gazeta Rolnicza* 61: 698-699, 718-720, 742-744.
- Gratiani, A.M. 1669. *De Vita Joannis Francisci Com-mendoni Cardinalis Libri Quatuor*. Mabre-Cramoisy Parisiis, France.
- Green, P. 2013. *The Free Living Ponies within the Exmoor National Park: their status, welfare and Future*. A report to the Exmoor Moorland Landscape Partnership. South Woolley Farm, Shirwell, UK.
- Guthrie, R. D. 1990. *Frozen fauna of the Mammoth Steppe - The story of Blue Babe*. The University of Chicago Press, Chicago, USA / London, UK.
- Hacquet, B. 1794. *Hacquet's neueste physikalisch-politische Reisen in den Jahren 1791, 92. und 93. Durch die Dacischen und Sarmatischen oder Nördlichen Karpathen*. Dritter Theil. Nürnberg, Germany.
- Heck, H. & L. Heck 1934. *Die Rückzüchtung des alt-deutschen Waldpferdes*. *Das Tier und wir* 7: 10-14.
- Hedemann, O. 1939. *Dzieje Puszczy Białowieskiej w Polsce przedrozbiorowej (w okresie do 1798 roku)*. Instytut Badawczy Lasów Państwowych. *Rozprawy i sprawozdania*. Seria A, nr 41, Warszawa, Poland.
- Herre, W. 1939. *Beiträge zur Kenntnis der Wildpferde*. *Zeitschrift für Tierzüchtung und Züchtungsbiologie* 44 (3): 342-363.
- Hirsch, Th. 1863. *Die littauischen Wegeberichte*. *Scriptores Rerum Prussicarum* 2: 662-711.
- Hovens, H. & T. Rijkers 2013. *On the origins of the Exmoor pony: did the wild horse survive in Britain?* *Lutra* 56 (2): 129-136.
- Hüster-Plogmann, H., J. Schibler & S. Jacomet 1999. *The significance of aurochs as hunted animal in the Swiss Neolithic*. In: G.-C. Weniger (ed.). *Archäologie und Biologie des Aurochs*: 151-160. Neanderthal Museum, Mettmann, Germany.
- Jędrzejewska, B. & W. Jędrzejewski 1998. *Predation in vertebrate communities: the Białowieża Primeval Forest as a case study*. Springer, Berlin, Germany.
- Jeziński, T. & Z. Jaworski 2008. *Das Polnische Konik*. *Die Neue Brehm-Bücherei*. Bd. 658. Westarp Wissenschaften, Hohenwarsleben, Germany.

- Kluk, K. 1779. Zwierząt domowych i dzikich osobliwie kraioowych, historyi naturalney początki i gospodarstwo potrzebnym i pożytecznym chowanie, rozmnażenie, chorób leczenie, dzikich łowienie, oswojenie za życia, szkodliwych zaś wygubienie. Tom 1, O zwierzętach. Warszawa, Poland.
- Kolbert, E. 2012. Recall of the wild. *The New Yorker*, December 24 & 31: 50-60.
- Kupryjanowicz, M. 2004. The vegetation changes recorded in sediments of Kładkowe Bagno peat bog in Puszcza Knyszyńska Forest, north-eastern Poland. *Acta Palaeobotanica* 44 (2): 175-193.
- Kupryjanowicz, M. 2007. Postglacial development in the vicinity of the Wigry Lake. *Geochronometria* 27: 53-66.
- Kuzmina, I.E. 1997. Horses of North Eurasia from the Pliocene till the present time. In: N.K. Vereshchagin (ed.). *Proceedings of the Zoological Institute* 273. Russian Academy of Sciences, St. Petersburg, Russia [in Russian with English summary].
- Kuzmina, E.E. 2003. Origins of pastoralism in the Eurasian steppes. In: M. Levine, C. Renfrew & K. Boyle (eds.). *Prehistoric Steppe Adaptation and the Horse*: 203-232. McDonald Institute, Cambridge, UK.
- Laarman, F.J. 2001. Archeozoölogie: aard en betekenis van de dierlijke resten. In: J.W.H. Hogestijn & J.H.M. Peeters (eds.). *De mesolithische en vroeg-neolithische vindplaats Hoge Vaart-A27 (Flevoland)*. Rapportage Archeologische Monumentenzorg 79 (16). Amersfoort, the Netherlands.
- Lauwerier, R.C.G.M., T. van Kolfschoten & L.H. van Wijngaarden Bakker 2005. De archeozoölogie van de steentijd. In: J. Deeben, E. Drenth, M.-F. van Oorsouw & L. Verhart (eds.). *De steentijd van Nederland*: 39-66. Stichting Archeologie, Zutphen, the Netherlands.
- Levine, M.A. 1999. Botai and the origins of horse domestication. *Journal of Anthropological Archaeology* 18 (1): 29-78.
- Linnartz, L. & W. Helmer 2009. Uitwerkingsplan Oostvaardersplassen. ARK Natuurontwikkeling, Hoog Keppel, the Netherlands.
- Litt, T. 2000. Waldland Mitteleuropa – die Megaherbivorentheorie aus paläobotanischer Sicht. In: Bayerische Landesanstalt für Wald und Forstwirtschaft (LWF). *Grosstiere als Landschaftsgestalter – Wunsch oder Wirklichkeit? Berichte aus der Bayerischen Landesanstalt für Wald und Forstwirtschaft* 27: 49-64.
- Lizet, B. & P. Daszkiewicz 1995. Tarpan ou konik polski? Mythe contemporaine et outil de gestion écologique. *Anthropozoologica* 21: 63-72.
- Lõugas, L. 2006. Animals as subsistence and bones as raw material for settlers of prehistoric Zvejnieki. In: L. Larsson & I. Zagorska (eds.). *Back to the Origin. New research in the Mesolithic-Neolithic Zvejnieki cemetery and environment, Northern Latvia*. *Acta Archaeologica Lundensia* 52: 75-89.
- Louwe Kooijmans, L.P. 2012. Holland op z'n wildst? De Vera-hypothese getoetst aan de prehistorie. *De Levende Natuur* 113 (2): 62-66.
- Mager, F. 1941. *Wildbahn und Jagd Altpreußens im Wandel der geschichtlichen Jahrhunderte*. J. Neumann, Neudamm, Poland / Berlin, Germany.
- Mager, F. 1960. *Der Wald in Altpreußen als Wirtschaftsraum*. Band I und II. Böhlau Verlag, Köln, Germany.
- Markerink, M. 2002. Koniks: Wilde paarden in Nederland. Stichting Ark, Hoog Keppel, the Netherlands.
- Mitchell, F.J.G. 2005. How open were European primeval forests? Hypothesis testing using palaeoecological data. *Journal of Ecology* 93 (1): 168-177.
- Mitchell, F.J.G. & E. Cole 1998. Reconstruction of long-term successional dynamics of temperate woodland in Białowieża Forest, Poland. *Journal of Ecology* 86: 1042-1059.
- Modderman, P.J.R. 1953. Een neolithische woonplaats in de polder Vriesland onder Hekelingen (Eiland Putten) (Zuid-Holland). *Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek in Nederland* IV (2): 1-26.
- Mol, D., K. Post, J.W.F. Reumer, J. van der Plicht, J. de Vos, B. van Geel, G. van Reenen, J.P. Pals & J. Glimmerveen 2006. The Eurogeul - first report of the palaeontological, palynological and archaeological investigations of this part of the North Sea. *Quaternary International* 142-143: 178-185.
- Mortensen, H. & G. Mortensen 1938. *Die Besiedlung des Nordöstlichen Ostpreußens bis zum Beginn des 17. Jahrhunderts*. Teil II: Die Wildnis im östlichen Preußen, ihr Zustand um 1400 und ihre frühere Besiedlung. Verlag von S. Hirzel, Leipzig.

- Olf, H., F.W.M. Vera, J. Bokdam, E.S. Bakker, J.M. Gleichman, K. de Maeyer & R. Smit 1999. Shifting mosaics in grazed woodlands driven by the alteration of plant facilitation and competition. *Plant Biology* 1: 127-137.
- Outram, A.K., N.A. Stear, R. Bendrey, S. Olsen, A. Kasparov, V. Zaibert, N. Thorpe & R.P. Evershed 2009. The earliest horse harnessing and milking. *Science* 323 (6): 1332-1335.
- Pluskowski, A. 2013. *The Archaeology of the Prussian Crusade – Holy war and colonization*. Routledge, Abingdon-New York, USA.
- Ponel, P., V. Matterné, N. Coulthard & J.H. Yvenec 2000. La Tène and Gallo-Roman natural environments and human impact of the Touffreville rural settlement, reconstructed from Coleoptera and plant macroremains (Calvados, France). *Journal of Archaeological Science* 27 (11): 1055-1072.
- Poorter, E.P.R. 1982. Ganzen en riet in de Oostvaardersplassen. *Vakblad voor Biologen* 62 (20): 398-399.
- Poortinga, G. 1981. Stichting Tarpan. *Noorderbreedte* 5 (5): 144-145.
- Pruski, W. 1959. *Dzikie konie Wschodniej Europy*. Roczniki Nauk Rolniczych. Tom 85-D. Państwowe Wydawnictwo Rolnicze i Leśne, Warszawa, Poland.
- Reed, S. 2013. A Dutch plan to let nature takes its course. *The New York Times*, 9-18-2013.
- Ripple, W.J. & R.L. Beschta 2012. Large predators limit herbivore densities in northern forest ecosystems. *European Journal of Wildlife Research* 58 (4): 733-742.
- Rzeczyński, G. 1721. *Historia naturalis curiosa Regni Poloniae, Magni Ducatus Lithuaniae, annexarumq; provinciarum, in tractatus XX divisa*. Sandomiriae.
- Schlüter, O. 1921. *Wald, Sumpf und Siedlungsland in Altpreussen vor der Ordenszeit*. Niemeyer, Halle (Saale).
- Skorkowski, E. 1934. Krytyczne uwagi o ‘Tarpanie leśnym’. *Kosmos* 59 (2): 197-205.
- Smit, R., R. Hillen, J.D. Hillen & F.W.M. Vera 2010. *The Oostvaardersplassen: Beyond the horizon of the familiar*. The Dutch Forestry Commission, Driebergen, the Netherlands.
- Sommer, R.S., N. Benecke, L. Lóugas, O. Nelle & U. Schmölcke 2011. Holocene survival of the wild horse in Europe: a matter of open landscape? *Journal of Quaternary Science* 26 (8): 805-812.
- Staatsbosbeheer: <http://www.staatsbosbeheer.nl/Natuurgebieden/Oostvaardersplassen.aspx?searchresults=1>
- Stella, E. 1518. *De Borussiae antiquitatibus*. Libri duo. Basileae, Switzerland.
- Svenning, J.-C. 2002. A review of natural vegetation openness in North Western Europe. *Biological Conservation* 104: 133-148.
- Tanentzap, A.J., E.P. Mountford, A.S. Cooke & D.A. Coomes 2012. The more stems the merrier: advantages of multi-stemmed architecture for the demography of understorey trees in a temperate broadleaf woodland. *Journal of Ecology* 100: 171-183.
- Timpany, S. 2005. *A Palaeoecological Study of Forests in the Severn Estuary and Bristol Channel*, UK. PhD thesis. University of Reading, UK.
- Timpe, D. 1989. *Wegeverhältnisse und römische Okkupation Germaniens*. In: H. Jankuhn, W. Kimmig & E. Ebel (eds.). *Untersuchungen zu Handel und Verkehr der vor- und frühgeschichtlichen Zeit in Mittel- und Nordeuropa*. Teil V: *Der Verkehr, Verkehrswege, Verkehrsmittel, Organisation*: 83-107. *Abhandlungen der Akademie der Wissenschaften in Göttingen. Philologisch-Historische Klasse, Dritte Folge*, nr. 180.
- Uerpmann, H.P. 1990. *Die Domestikation des Pferdes im Chalkolithikum West-und Mitteleuropas*. *Madriider Mitteilungen* 31: 109-153.
- van Asperen, E.N. 2010. *Ecomorphological adaptations to climate and substrate in the late Middle Pleistocene caballoid horses*. *Palaeogeography, Palaeoclimatology, Palaeoecology* 297: 584-596.
- van Beusekom, C.F. 2014. *Staatsbosbeheer is de weg kwijt*. Lecture held for the *Stichting Welzijn Grote Grazers* (Foundation Welfare Large Grazers), March 29, 2014 at Hengelo.
- van de Klundert, B. 2012. *Expeditie wildernis. Ervaringen met het sublieme in de Nederlandse natuur*. KNNV Uitgeverij, Zeist / Uitgeverij Landwerk, Wageningen, the Netherlands.
- van der Lans, H. & G. Poortinga 1986. *Natuurbos in Nederland – een uitdaging*. IVN, Amsterdam, the Netherlands.
- van de Veen, H.E. & S.E. van Wieren 1980. *Van grote grazers, kieskeurige fijnproevers en opportunistis-*

- tische gelegenheidsvreters. Instituut voor Milieuvraagstukken, Vrije Universiteit, Amsterdam, the Netherlands.
- van Manen, W. 2013. Broedvogels van de buitenkaadse Oostvaardersplassen in 1997, 2002, 2007 en 2012. SOVON-rapport 2013/30. SOVON Vogelonderzoek Nederland, Nijmegen, the Netherlands.
- van Vuure, T. 2005. Retracing the aurochs – history, morphology and ecology of an extinct wild ox. Pensoft, Sofia, Bulgaria / Moscow, Russia.
- van Vuure, T., in press. From kaikan to konik – Facts and perceptions surrounding the European wild horse and the Polish konik.
- Veer, M., R. Abma & R. Berkers 2005. Recreatie in de Oostvaardersplassen anno 2005 – Aanbod, gebruik, waardering en beleving. Stichting Recreatie, Den Haag, the Netherlands.
- Vera, F.W.M. 1984. Voorstel voor introductie van Konik-paarden op het Stort. November 1984. Vergadernotitie ten behoeve van de vergadering van de Beheerscommissie Oostvaardersplassengebied.
- Vera, F.W.M. 2000. Grazing Ecology and Forest History, CABI, Wallingford, UK.
- Vera, F.W.M., F. Buissink & J. Weidema 2007. Wilderness in Europe: What really goes on between the trees and the beasts. Tirion, Baarn, the Netherlands.
- Vetulani, T. 1927. Znaczenie konika polskiego dla nauki i hodowli. Dziennik Urzędowy Lubelskiego 21: 489-493.
- Vetulani, T. 1936. Die Wiedereinführung des Waldtarpans in den Urwald von Białowieża (Bialowies). Bulletin International de l'Académie Polonaise des Sciences et des Lettres. Classe des Sciences Mathématiques et Naturelles. Série B. Sciences Naturelles. 2. Zoologie: 205-215.
- Vetulani, T. 1938. Beitrag zur Charakteristik der primitiven Landpferde Polens. Zeitschrift für Tierzucht und Züchtungsbiologie 41 (3): 271-304.
- Wacznik, A. 2009. From foraging to farming in the Great Mazurian Lake District: palynological studies on Lake Miłkowskie sediments, northeast Poland. Vegetation History and Archaeobotany 18: 187-203.
- Wajrak, A. 2000. Powrót hitlerowskiej krowy. Gazeta Wyborcza, nr. 76 (30-3-2000), Magazyn nr. 13: 6-15.
- Wigbels, V.L. 2002. Leve de Oostvaardersplassen! Staatsbosbeheer, Regio Flevoland-Overijssel, the Netherlands.
- Zeiler, J.T. 1997. Hunting, Fowling and Stock-breeding at Neolithic Sites in the Western and Central Netherlands. PhD Thesis, Groningen University, the Netherlands.
- Zeiler, J.T. & L.I. Kooistra 1998. Parklandschap of oerbos? Interpretatie van het prehistorische landschap op basis van dieren- en plantenresten. Lutra 40 (2): 65-76.
- Zoller, H. & N. Haas 1995. War Mitteleuropa ursprünglich eine halboffene Weidelandschaft oder von geschlossenen Wäldern bedeckt? Schweizerische Zeitschrift für Forstwesen 146 (5): 321-354.

Samenvatting

Over het ontstaan van de Poolse konik en de relatie ervan met het natuurbeheer in Nederland

Nadat de laatste ijstijd was geëindigd, heeft het wilde paard gedurende een groot deel van het Holoceen als relatief zeldzaam dier weten te overleven in het sterk beboste West- en Centraal-Europa. Jacht en verdrijving van zijn voedselgronden door de mens hebben de aantallen van deze paarden steeds meer doen afnemen. Waarschijnlijk heeft de laatste populatie van deze paarden tot in de 16^e eeuw in het wild kunnen overleven in het grensgebied van Oost-Pruisen, Polen en Litouwen. De laatste exemplaren zijn door Jan Zamoyski ondergebracht in zijn dierentuin in Zwierzyniec (ZO-Polen). Daar is deze (onder)soort op het eind van de 18^e eeuw aan zijn eind gekomen.

Op basis van het verslag van Julius Brincken in 1826, waarin vermeld werd dat de laatste wilde paarden rond 1806 gekruist zouden zijn met boerenpaarden, is Tadeusz Vetulani in Polen in 1936 een terugfokexperiment in het Bos van Białowieża begonnen. Het was de bedoeling om, door selectie en kruising van boerenpaarden uit de omgeving van Biłgoraj, de wilde voorouder terug te krijgen. Na Vetu-

lani's dood in 1952 is dit experiment door de Poolse staat overgenomen en verplaatst naar Popielno (NO-Polen). Na staking van het terugfokexperiment, rond 1970, wordt de konik daar tegenwoordig alleen nog als 'primitief paardenras' gefokt.

Op grond van diverse argumenten is aangetoond dat het verslag van Brincken over het wilde paard niet op waarheid berust. Om deze reden, en omdat Vetulani zijn experiment op een onzorgvuldige manier heeft uitgevoerd, moet diens terugfokexperiment als niet geslaagd worden beschouwd.

In het kader van een goedkoper en 'natuurlijker' natuurbeheer, zijn in 1981 koniks in Nederland op het landgoed Ennemaborgh uitgezet, en in 1984 in het natuurreservaat Oostvaardersplassen. De konik werd en wordt in de beeldvorming namelijk beschouwd als 'de meest recente afstammeling van het wilde paard'. Door een bepaalde woordkeuze door de beheerders van de Oostvaardersplassen en sommige media, zoals 'de natuur haar gang laten gaan', 'oerlandschap' en 'Serengeti', is er sprake van het *framen* van de Oostvaardersplassen als een ongerept en natuurlijk ecosysteem.

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Notes

1. There is disagreement on the scientific naming of this horse. Some use the name *Equus ferus* for it, as distinct from *Equus caballus*, the domestic horse. Others use the name *Equus caballus* or *Equus caballus ferus*. The name *Equus ferus* was first given by P. Boddaert (1785), based on the data by S.G. Gmelin (1770). However, there are doubts about the original wildness of the horses described by Gmelin (van Vuure, in press). For the Holocene wild horse of Western and Central Europe, I use the term 'wild horse', by analogy with 'wild cat' (*Felis silvestris*) and 'wild boar' (*Sus scrofa*). In the course of the 18th Century, the name 'tarpan' popped up in the literature on the Russian steppes. It is not clear

whether 'tarpan' was a designation for originally wild horses or for feral domestic ones.

2. Arguments for this point of view can be drawn from research on pollen, bones and plant macrofossils (e.g. Zoller & Haas 1995, Mitchell & Cole 1998, Zeiler & Kooistra 1998, Litt 2000, Svenning 2002, Mitchell 2005), from insect research (e.g. Girling 1989, Dinnin & Sadler 1999, Ponel et al. 2000, Svenning 2002) and research on land molluscs (e.g. Gedda 2001, Svenning 2002, Davies 2008). This is supported by the works by Roman writers like Caesar (58-52 BCE) and Tacitus (98 CE) (for both: see Timpe 1989). Other evidence can be found in the history of the primeval Forest of Białowieża (Błoński et al. 1888, Hedemann 1939), from descriptions and palynological research of the Great Wilderness in what was formerly East Prussia (e.g. Hirsch 1863, Schlüter 1921, Mortensen 1938, Mager 1960, Kupryjanowicz 2004, 2007, Wacznik 2009, Pluskowski 2013), from research on the Mesolithic and Neolithic 'submerged forests' on the British coasts (Timpany 2005), and from Louwe Kooijmans (2012).
3. In Germany, the brothers Heinz and Lutz Heck, according to their account, got there before him by a few years. In 1933 already, they claimed to have bred a 'Waldpferd' ('forest horse') (Heck & Heck 1934). They had done this by crossing Przewalski's horses with Icelandic horses and koniks. Later, especially during World War II, they would cross in even more koniks, most of them illegally obtained from Vetulani's experiment at Białowieża.
4. After a continuous increase since 1992, from 2011 on the number of red deer started to fall. On 1 May 2011, the number of red deer was around 2870, on 1 May 2012 it was around 2490, and on 1 May 2013 it was around 1910. On 1 May 2014, after an exceptionally mild winter, the number had increased to around 2390 (see the annual reports on this on the website of Staatsbosbeheer (Dutch Forestry Commission): <http://www.staatsbosbeheer.nl/Nieuws%20en%20achtergronden/Themas/Oostvaardersplassen/Feiten%20en%20cijfers.aspx>